

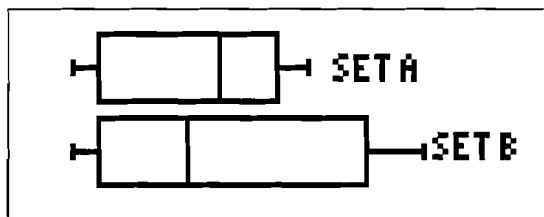
Practice Exam 2

Section I



Time: 1 hour and 30 minutes; number of questions: 40; percentage of total grade: 50

Directions: Solve each of the following problems. Decide which is the best of the choices given and answer in the appropriate place on the answer sheet. No credit will be given for anything written on the exam. Do not spend too much time on any one problem.



1. Given the two boxplots above, which of the following statements is true?
 - I. The boxplot for Set B has more terms above its median than the boxplot for Set A.
 - II. The boxplot for Set B has a larger IQR than the boxplot for set A.
 - III. The median for Set A is larger than the median for set B.
 - a. I only
 - b. II only
 - c. III only
 - d. I and II only
 - e. II and III only

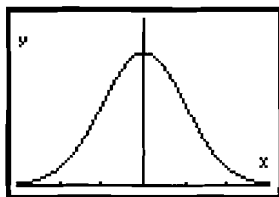
2. For a hypothesis test of $H_0: \mu = \mu_0$ against the alternative $H_A: \mu < \mu_0$, the z -test statistic is found to be 2.00. This finding is
 - a. significant at the .05 level but not at the .01 level
 - b. significant at the .01 level but not at the .05 level
 - c. significant at both the .01 level and the .05 level
 - d. significant at neither the .01 level nor the .05 level
 - e. None of the above are correct.
3. A statistics class wanted to construct a 90% confidence interval for the difference in the number of advanced degrees held by male and female faculty members at their school. They collected degree data from all the male and female faculty members and then used these data to construct the desired 90% confidence interval. Is this an appropriate way to construct a confidence interval?
 - a. No, because we don't know that the distributions involved are approximately normal.
 - b. Yes, but only if the number of men and the number of women are equal because our calculations will be based on difference scores.
 - c. Yes, but only if the distribution of difference scores has no outliers or extreme skewness.
 - d. No, because all the data were available, there is no need to construct a confidence interval for the true difference between the number of degrees.
 - e. No, confidence intervals can only be constructed on independent samples, not on paired differences.
4. You are interested in determining which of two brands of tires (call them Brand G and Brand F) last longer under differing conditions of use. Fifty Toyota Camrys are fitted with Brand G tires and 50 Honda Accords are fitted with Brand F tires. Each tire is driven 20,000 miles, and tread wear is measured for each tire, and the average tread wear for the two brands is compared. What is wrong with this experimental design?
 - a. The type of car is a confounding variable.
 - b. Average tread wear is not a proper measure for comparison.
 - c. The experiment should have been conducted on more than two brands of cars.
 - d. Not enough of each type of tire was used in the study.
 - e. Nothing is wrong with this design—it will work quite well to compare the two brands of tires.
5. The following are the probability distributions for two random variables, X , and Y :

X	$P(X = x)$	Y	$P(Y = y)$
3	$\frac{1}{3}$	1	$\frac{1}{8}$
5	$\frac{1}{2}$	3	$\frac{3}{8}$
7	$\frac{1}{6}$	4	?
		5	$\frac{3}{16}$

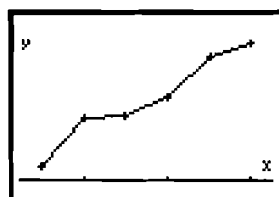
If X and Y are independent, what is $P(X = 5 \text{ and } Y = 4)$?

- $5/16$
 - $13/16$
 - $5/32$
 - $3/32$
 - $3/16$
6. Which of the following will reduce the width of a confidence interval?
- Increase the sample size
 - Increase the confidence level
 - Increase the variability of the sample
- I only
 - II only
 - III only
 - I and II
 - I and III
7. Which of the following graphs could be the graph of a cumulative frequency plot?

a.



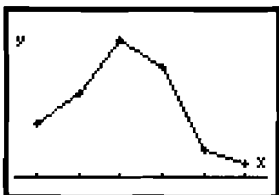
b.



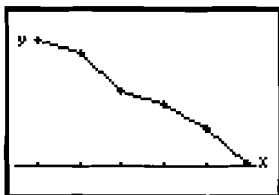
c.



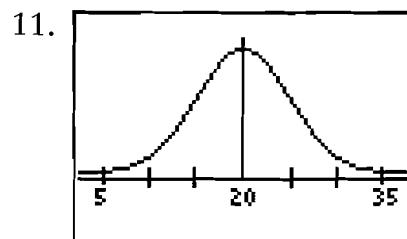
d.



e.



8. Consider the following set of data: {15, 17, 37, 45, 51, 52, 53, 56, 56, 57, 60, 63, 65, 67, 89}. Which of the following, using the 1.5(IQR rule) are outliers?
- 89 only
 - 15 and 89 only
 - 15 only
 - 15, 17, and 89
 - 15 and 17 only
9. At Midtown University, the average weight of freshmen boys is 170 lbs. with a standard deviation of 9 lbs. The average weight of freshmen girls is 115 lbs. with a standard deviation of 6 lbs. A new distribution is to be formed of the values obtained when the weights of the girls and the boys are added together. What are the mean and standard deviation of this new distribution? Assume that the weights of freshman boys and freshman girls are independent.
- 285, 15
 - 285, 117
 - 55, 10.8
 - 285, 10.8
 - The mean is 285 but, under the conditions stated in the problem, you cannot determine the standard deviation.
10. Fifty boys and 50 girls with ADHD (Attention Deficit Hyperactivity Disorder) were selected for an experiment to test a new drug for the treatment of ADHD. Half of the boys and half of the girls were selected at random to receive the new drug, and the other half of each group received a placebo. A reduction in symptoms of ADHD was measured for each subject. The basic design of this experiment is
- completely randomized
 - completely randomized with one factor, gender
 - randomized block, blocked by drug and gender
 - randomized block, blocked by gender
 - randomized block, blocked by drug



Which of the following is the best estimate of the standard deviation for the approximately normal distribution pictured?

- 10
- 30

- c. 5
d. 9
e. 15
12. You own an unusual die. Three faces are marked with the letter "X," two faces with the letter "Y," and one face with the letter "Z." What is the probability that at least one of the first two rolls is a "Y?"
- a. $1/6$
b. $2/3$
c. $5/9$
d. $1/3$
e. $2/9$
13. Sometimes, the order in which a question is asked makes a difference in how it is answered. For example, if you ask people if they prefer chocolate or strawberry ice cream, you might get different answers than if you asked them if they prefer strawberry or chocolate. Seventy-five randomly selected people were asked, "Do you prefer chocolate or strawberry?" and seventy-five different randomly selected people were asked, "Do you prefer strawberry or chocolate?" The results are given in the following table.

	Response: Prefer Chocolate	Response: Prefer Strawberry
Question: Do you prefer chocolate or strawberry?	42	33
Question: Do you prefer strawberry or chocolate?	34	41

- A two-proportion z test was performed on these data to see if the order of the question made a difference. What is the P value of the test (hint: you need to think about whether this is a one-sided or a two-sided test)?
- a. .453
b. .096
c. .56
d. .055
e. .19
14. The correlation between two variables X and Y is $-.26$. A new set of scores, X^* and Y^* , is constructed by letting $X^* = -X$ and $Y^* = Y + 12$. The correlation between X^* and Y^* is
- a. $-.26$
b. $.26$

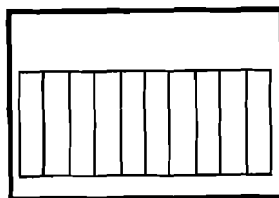
- c. 0
- d. .52
- e. $-.52$

15. Which of the following best describes a “double-blind” study?

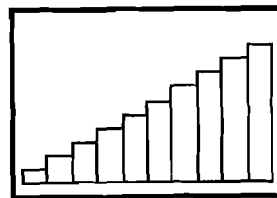
- a. The subjects are placed into treatment and control groups in such a manner that they do not know to which group they are assigned.
- b. The subjects are randomly assigned to treatment and control groups that controls for possible unknown biases that might be present in the study.
- c. Neither the subjects in the study nor the administrator of the study are aware of which subjects are in the treatment group and which are in the control group.
- d. a technique for placing subjects in groups so as to protect against the placebo effect
- e. Volunteers are assigned to groups in such a way that they do not know into which groups the other volunteers have been placed.

16. Which of the five histograms pictured below has the smallest standard deviation?

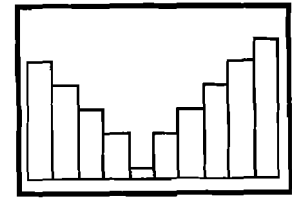
a.



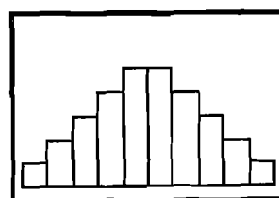
b.



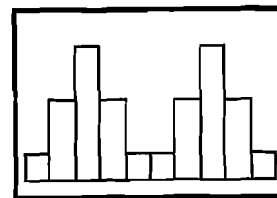
c.



d.



e.



17. One technique of drawing a sample for a survey is to select a stratified random sample. The purpose of this type of sample is to

- a. Ensure that the sample is a simple random sample of the population.
- b. Ensure that the sample is representative of the groups of interest in the population.
- c. Economize by not having to sample from the entire population.
- d. Control for lurking variables.
- e. Reduce the numbers you need to sample to arrive at valid conclusions.

18. You roll two dice. What is the probability that the sum is six given that one die shows a 4?
- 2/12
 - 2/36
 - 11/36
 - 2/11
 - 12/36
19. The main difference between a χ^2 test for independence and a χ^2 test for homogeneity of proportions is which of the following?
- They are based on a different number of degrees of freedom.
 - One of the tests is for a two-sided alternative and the other is for a one-sided alternative.
 - The expected values are the same but are computed differently.
 - For a given value of χ^2 , they have different P values.
 - There are no differences between the tests—they measure exactly the same thing.
20. Which of the following is a reason for choosing a z procedure rather than a t procedure when making an inference about the mean of a population?
- The standard deviation of the population is unknown.
 - The sample was a simple random sample.
 - The sample size is less than 40.
 - The shape of the population from which the sample is drawn is unknown.
 - The sample size is large enough to use the central limit theorem.
21. You play a game that involves rolling a die. You either win or lose \$1 depending on what number comes up on the die. If the number is even, you lose \$1, and if it is odd, you win \$1. However, the die is weighted and has the following probability distribution for the various faces:

Face	1	2	3	4	5	6
Win (x)	+1	-1	+1	-1	+1	-1
$p(x)$.15	.20	.20	.25	.1	.1

Given that you win rather than lose, what is the probability that you rolled a "5?"

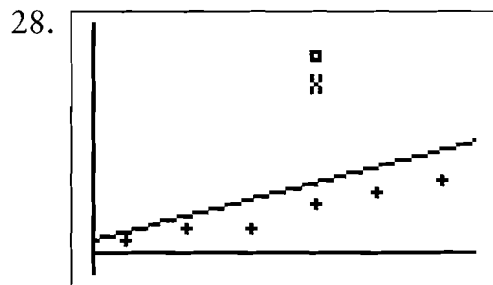
- .50
- .10
- .45
- .22
- .55

22. A psychiatrist is studying the effects of regular exercise on stress reduction. She identifies 40 people who exercise regularly and 40 who do not. Each of the 80 people is given a questionnaire designed to determine stress levels. None of the 80 people who participated in the study knew that they were part of a study. Which of the following statements is true?
- This is an observational study.
 - This is a randomized comparative experiment.
 - This is a double-blind study.
 - This is a matched-pairs design.
 - This is an experiment in which exercise level is a blocking variable.
23. Shanelle got the same score, 51, on two consecutive calculus quizzes. The mean for the class on the first quiz was 43 with a standard deviation of 6. The mean on the second quiz was 38 with a standard deviation of 9. Relative to the class, on which quiz did Shanelle do better?
- She did better on quiz #1.
 - She did better on quiz #2.
 - She did equally well on each quiz because she got the same score.
 - She did better on quiz #2 because she was further above the mean than she was on quiz #1.
 - You cannot answer this question without knowing how many students actually took each quiz.
24. This year's statistics class was small (only 15 students). This group averaged 74.5 on the final exam, with a sample standard deviation of 3.2. Assuming that this group is a random sample of all students who have taken statistics, and the scores on the final exam for all students are approximately normally distributed, which of the following is an approximate 96% confidence interval for the true population mean of all statistics students?
- 74.5 ± 7.245
 - 74.5 ± 7.197
 - 74.5 ± 1.871
 - 74.5 ± 1.858
 - 74.5 ± 1.772
25. The distribution of a set of scores has mean of 35 and standard deviation of 12. Five is subtracted from each term in the distribution, and the result is multiplied by three. The new mean and standard deviation are
- $\mu = 105, \sigma = 36$
 - $\mu = 90, \sigma = 12$
 - $\mu = 30, \sigma = 12$
 - $\mu = 90, \sigma = 36$
 - $\mu = 90, \sigma = 21$

Use the following information in questions 26–27:

Baxter is a 60% free-throw shooter who gets fouled during a game and gets to shoot what is called a “one-and-one” (that is, he gets to take a second shot—a bonus—if and only if he makes his first shot; each free throw, if made, is worth one point). Baxter can make 0 points (because he misses his first shot), 1 point (he makes the first shot, but misses the bonus), or 2 points (he makes his first shot and the bonus).

26. Assuming that each shot is independent, how many points is Baxter *most likely* to make in a one-and-one situation?
- 2
 - 1
 - 0
 - .96
 - none of these is correct
27. Assuming that each shot is independent, how many points will Baxter make *on average* in a one-and-one situation?
- 2
 - .96
 - 0
 - 1
 - .36



For the graph given above, which of the following statements are true?

- The point marked with the “X” is better described as an outlier than as an influential point.
 - Removing the point “X” would cause the correlation to increase.
 - Removing the point “X” would have a significant effect on the slope of the regression line.
- I and II only
 - I only
 - II only
 - II and III only
 - I, II, and III

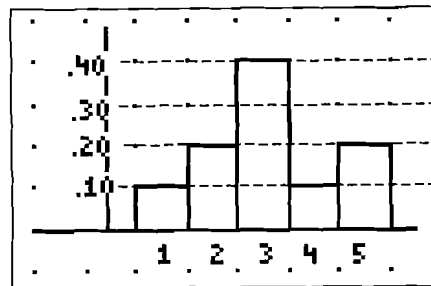
29. An electronics firm wants to survey its employees to determine their attitudes toward employee compensation. They obtain the sample for the survey by randomly selecting one of the first 20 names on an alphabetical list of employees and then select each 20th name on the list from then on. This is an example of which of the following?

- a. simple random sample
- b. cluster sample
- c. stratified random sample
- d. convenience sample
- e. systematic sample

30. Results of an experiment or survey are said to be *biased* if

- a. Subjects are not assigned randomly to treatment and control groups.
- b. Some outcomes are systematically favored over others.
- c. There was no control group.
- d. A double-blind procedure was not used.
- e. The sample size was too small to control for sampling variability.

31.



Given the probability histogram pictured for a discrete random variable X , what is μ_X ?

- a. 3.0
- b. .25
- c. 2.5
- d. 3.1
- e. 2.8

32. A paint manufacturer advertises that one gallon of its paint will cover 400 sq. ft. of interior wall. Some local painters suspect the average coverage is considerably less and decide to conduct an experiment to confirm their suspicions. If μ represents the true average number of square feet covered by the paint, which of the following are the correct null and alternative hypotheses to be tested?

- a. $H_0: \mu = 400$
 $H_A: \mu > 400$
- b. $H_0: \mu \geq 400$
 $H_A: \mu \neq 400$

- c. $H_0: \mu = 400$
 $H_A: \mu \neq 400$
 - d. $H_0: \mu \neq 400$
 $H_A: \mu < 400$
 - e. $H_0: \mu \geq 400$
 $H_A: \mu < 400$
33. Free response questions on the AP Statistics Exam are graded on 4, 3, 2, 1, or 0 basis. Question #2 on the exam was of moderate difficulty. The average score on question #2 was 2.05 with a standard deviation of 1. To the nearest tenth, what score was achieved by a student who was at the 90th percentile of all students on the test? You may assume that the scores on the question were approximately normally distributed.
- a. 3.5
 - b. 2.5
 - c. 2.9
 - d. 2.7
 - e. 3.2
34. 40% of the staff in a local school district have master's degrees. One of the schools in the district has only 4 teachers out of 15. You are asked to design a simulation to determine the probability of getting this few teachers with master's degrees in a group this size. Which of the following assignments of the digits 0 through 9 would be appropriate for modeling this situation?
- a. Assign "0,1,2" as having a master's degree and "4,5,6,7,8,9" as not having a degree.
 - b. Assign "1,2,3,4,5" as having a master's degree and "0,6,7,8,9" as not having a degree.
 - c. Assign "0,1" as having a master's degree and "2,3,4,5,6,7,8,9" as not having a degree
 - d. Assign "0,1,2,3" as having a master's degree and "4,5,6,7,8,9" as not having a degree
 - e. Assign "7,8,9" as having a master's degree and "0,1,2,3,4,5,6," as not having a degree.
35. Which of the following statement is true about the t distribution?
- I. Its mean, median, and mode are all equal.
 - II. The t distribution is more spread out than the z distribution.
 - III. The greater the number of degrees of freedom, the greater the variance of a t distribution

- a. I only
 - b. II only
 - c. III only
 - d. I and II
 - e. I and III
36. A study showed that persons who ate two carrots a day have significantly better eyesight than those who eat less than one carrot a week. Which of the following statements are correct?
- I. This study provides evidence that eating carrots contributes to better eyesight.
 - II. The general health consciousness of people who eat carrots could be a confounding variable.
 - III. This is an observational study and not an experiment.
- a. I only
 - b. III only
 - c. I and II only
 - d. II and III only
 - e. I, II, and III
37. Two types of tennis balls were tested to determine which one goes faster on a serve. Eight different players served one of each type of ball and the results were recorded.

Server	Type A	Type B
Andre	120	115
Pete	125	122
Serena	119	114
Venus	110	114
Andy	118	115
Monica	82	91
Lleyton	115	110
Lindsey	105	106

Assuming that the speeds are approximately normally distributed, how many degrees of freedom will there be in the appropriate t test used to determine which type of tennis ball travels faster?

- a. 6
- b. 7
- c. 16
- d. 15
- e. 14

38. Given the cumulative frequency table shown below, what are the mean and median of the distribution?

Value	Cumulative Frequency
2	.15
3	.25
5	.45
7	.95
10	1.00

- a. Mean = 5.6, median = 7
 - b. Mean = 5.6, median = 5
 - c. Mean = 5.4, median = 7
 - d. Mean = 5.4, median = 5
 - e. Mean = 4.8, median = 6
39. Two statistics teachers want to compare their teaching methods and decide to give the same final exam and use the scores on the exam as a basis for comparison. They decide that the value of interest to them will be the number of students in each class who score above 80% on the final. One class has 32 students and one has 27 students. Which of the following would be the most appropriate test for this situation?
- a. Two-proportion z test
 - b. Two-sample t test
 - c. Chi-square goodness-of-fit test
 - d. One-sample z test
 - e. Chi-square test for independence
40. A well-conducted poll showed that 46% of a sample of 1500 potential voters intended to vote for Geoffrey Sleazy for governor. The poll had a reported margin of error of 3%. Which of the following best describes what is meant by “margin of error of 3%.”
- a. The probability is .97 that between 43% and 49% will vote for candidate Sleazy.
 - b. Ninety-seven percent of the time, between 43% and 49% would vote for candidate Sleazy.
 - c. Between 43% and 49% of voters will vote for Sleazy.
 - d. Three percent of those interviewed refused to answer the question.
 - e. The proportion of voters who will vote for Sleazy is likely to be between 43% and 49%.